



SERUM LACTATE DEHYDROGENASE LEVELS IN GASTROINTESTINAL TRACT CARCINOMA PATIENTS BEFORE AND AFTER SURGERY

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ABSTRACT

Background and Objectives: To study the role of Serum Lactate Dehydrogenase (LDH) as a diagnostic parameter in gastrointestinal tract (GIT) carcinoma patients. To compare the level of serum Lactate Dehydrogenase in metastatic and non metastatic Gastrointestinal tract carcinoma patients. To evaluate preoperative and post operative serum Lactate Dehydrogenase level in Gastrointestinal tract carcinoma patients.

Materials and Methods: Studied 20 patients of Gastrointestinal tract carcinoma admitted in surgical ward were selected for study group. Out of 20 patients, 15 patients were Gastrointestinal tract carcinoma without metastasis. 5 patients were Gastrointestinal tract carcinoma with metastasis. 20 healthy individuals were included in the control group. The correlation of serum Lactate Dehydrogenase levels in pre operative and post operative Gastrointestinal tract carcinoma patients were studied.

Results: Serum Lactate Dehydrogenase levels were elevated in pre operative GIT carcinoma patients with and without metastasis. Serum Lactate Dehydrogenase levels were decreased in post operative patients of Gastrointestinal tract carcinoma without metastasis but elevated in postoperative patients with metastasis.

Conclusion: The study showed serum Lactate Dehydrogenase as an independent diagnostic and prognostic bio marker.

Key Words: GIT carcinoma, Lactate Dehydrogenase, Metastasis

INTRODUCTION

Lactate Dehydrogenase (LDH) is an enzyme universally distributed in various tissues of the body. LDH is a cytoplasmic enzyme reversibly catalyses the conversion of pyruvate to lactate.



Recently metabolic reprogramming has been recognized as a hall mark of cancer. Tumor cells produce a substantial amount of their energy through glycolysis. Cancer cells utilize glycolysis for energy production under normoxic conditions. This allows cancer cells to sustain higher proliferation rates. Due to rapid tumor cells divided, high metabolic demands, tumor avascular area formation, hypoxia is a characteristic property in solid tumor cells, in turn convert majority of their glucose stores into lactate.

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Gastro intestinal carcinoma is one of the most common cause leading to death in developed as well as developing countries. The more common gastrointestinal carcinomas are of stomach, colorectal, esophageal, pancreas and biliary tract. Gastric cancer is the fourth most commonly diagnosed malignancy and the second leading cause of cancer death in worldwide [1]. The main problem of GIT tract malignancies is late detection of disease as the symptoms appear in late stage. The increasing rate of mortality in case of GIT carcinoma is also due to poor screening as well as negligence by the patient itself specially in developing countries. So the main challenge is to detect the cancer in early stage so that curative surgery can be done which has better prognosis.

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A biochemical marker which acts as an indicator of the disease at the beginning can be really be helpful in providing better management. Lactate Dehydrogenase enzyme estimation provides a better prognostic indicator[2]. Biochemical screening can be done by estimating serum lactate dehydrogenase either pre operatively for diagnosis or post operatively for prognosis. Serum lactate dehydrogenase is estimated to evaluate its diagnostic as well as prognostic implication in established GIT carcinoma cases[3].

Serum LDH has been found elevated in serum of GIT carcinoma cases. The degree of elevation of serum LDH closely reflects the clinical status of the patient. In case of distant metastasis the level of serum LDH is found to be significantly high.

This study showed Serum LDH as tumor marker of GIT tract carcinoma. As per cost wise this investigation is highly suitable, cheaper, accurate, feasibility as compared to any invasive procedure and is found to be higher in GIT carcinoma as well as higher in GIT carcinoma with metastasis.

MATERIALS AND METHODS

This is a prospective randomized study done for one year at Department of Biochemistry and the samples were collected from Department of General Surgery, Rangaraya Medical College, Kakinada.

Samples were collected from two groups. They were:

Study Group: 20 patients were selected with various types of GIT carcinomas from General Surgery wards of Government General Hospital, Kakinada.

Control Group: 20 healthy individuals were selected. Persons who did not have a medical history of Blood, skeletal muscle, cardiac, hepatic or renal diseases and any type of cancer previously which are associated with increased serum LDH levels.

Consent was taken from the patients and Ethical clearance has approved. The medical report was kept confidential.

Detailed history and thorough clinical examination was done. Special investigations like ultrasound, endoscopy and radiological investigations and other investigations as the case demanded. After confirmation of GIT carcinomas by the investigations. Blood Samples were collected preoperatively, hemolysis was avoided as it increases serum LDH levels.

This was followed by laparotomy with definite surgery to patients with GIT carcinoma, excised tissue was sent for histopathology examination for confirmation of Carcinoma.

Out of 20 patients -15 patients were GIT carcinomas without metastasis

05 patients were GIT carcinomas with metastasis.

Confirmation of pathological diagnosis of GIT carcinoma done by pathology department of Andhra Medical College, Visakhapatnam.

Blood Samples were also collected from study group post-operatively on 7th day as routine follow up of cases after surgery for prognostic purpose and also from control group to estimate serum LDH levels.

Methodology: Measurement of Serum LDH levels in both control and study group by UV kinetic method. Lactate dehydrogenase catalyses the conversion of pyruvate to lactate and the reduced coenzyme NADH to NAD⁺. LDH activity in the sample is directly proportional to the rate of decrease in the absorbance of NAD⁺ at 340nm.

Pyruvate + NADH + H⁺ -----LDH Lactate + NAD⁺

Statistical analysis: Statistical analysis has done by calculating p value using graphpad software.

RESULTS

Among total 20 study group, 15 patients diagnosed as GIT carcinoma without metastasis and 5 patients diagnosed as GIT carcinoma with metastasis.

Various type of Carcinomas were evaluated. Those GIT carcinomas were depicted in Table no:1. In one year study Carcinoma of stomach was most commonly diagnosed among various GIT carcinomas.

Table 1: Showing the incidence of various GIT carcinomas

S. No.	Carcinoma	No. of cases	Percentage (%)
1	Ca. of Oesophagus	5	25
2	Ca. of Stomach	6	30
3	Ca. of Colon	4	20
4	Ca. of Rectum	5	25

Among study group patients were in the age group of 35-75 years. Age and sex wise distribution were tabulated in Table No:2

Table 2: Age and Sex distribution among different GIT carcinomas

S. No.	GIT Carcinomas	Age in years	Sex		Total
			Male	Female	
1.	Ca. of Oesophagus	50-60	0	2	2
		60-70	3	0	3
2.	Ca. of Stomach	40-50	1	0	1
		50-60	1	1	2
		60-70	1	1	2
		70-75	1	0	1
3.	Ca. of Colon	35-50	3	1	4
4.	Ca. of Rectum	35-50	1	0	1
		50-60	3	0	3
		60-70	1	0	1
Total			15	5	20

Among 20 Study group, 18(90%) were Adenocarcinoma type and 2(10%) were Squamous cell carcinoma type. Serum LDH levels among Study group and Control group were mentioned in Table No:3. There is much difference in serum LDH levels in between preoperative and postoperative estimation.

Table 3: Showing Serum LDH levels among study and control group

S. No.	Groups	No. of cases	Serum Lactate Dehydrogenase Mean level		Difference in Pre operative and Post operative serum LDH levels
			Pre-operative	Post operative	
1.	Study group	20	276.15±79.87 IU/L	258.8±82.43 IU/L	17.35
2.	Control group	20	88.95±12.9 IU/L		-

Serum LDH levels were compared in patients of GIT carcinoma with and without metastasis (Table No:4). High levels of Serum LDH in cases with metastasis pre-operatively compared to cases without metastasis. Post-operatively Serum LDH value is slightly raised in cases with metastasis, but the value decreased in cases without metastasis.

Table 4: Showing observation of Serum LDH in Relation with Metastasis in GIT carcinoma

Metastasis	No of cases	Serum Lactate Dehydrogenase level			
		PRE-OPERATIVE		POST OPERATIVE	
		Mean	S.D	Mean	S.D
PRESENT	5	288	66.73	305.20	68.91
ABSENT	15	267.20	81.63	239.44	77.68

Table 5: Statistical analysis of observation of Serum LDH in Relation with Metastasis and without Metastasis, Pre-Operative Mean and S.D of study group.

Metastasis	No.of cases	Mean	S.D	't'	'df'	'P'	Remarks
With metastasis	5	288	66.73829	0.62	4	<0.001	Highly significant
Without Metastasis	15	267.20	82.859	0.16	44	<0.001	Highly Significant

DISCUSSION

Tumor cells has capacity to proliferate infinitely, which causes alteration in the metabolism of cells in turn there is a change in the levels of various factors like hormones, enzymes. Exploring these objective indicators is extremely important for clinical practice [4,5].

Serum LDH is a non-functional enzyme and the level is very low in growing periods. They appear in plasma only after destruction of erythrocytes and other cells. The pattern of rise of this intracellular enzyme vary according to involvement of specific organ and its rise in blood is helpful in the diagnosis of specific disease.

Several independent studies have shown that increased serum LDH levels or LDH-5 expression (as detected by immunohistochemistry) predicted poor prognosis and high metastasis risk in a spectrum of neoplastic diseases, including breast cancer, colorectal cancer, non-small cell lung cancer, endometrial cancer, and gastric cancer[6,7].

In malignancy the newer cells are being generated and the large number of malignant cells are destroyed by tumor necrosis factors and others. As discussed earlier this process leads to rise of various intracellular enzymes level in blood. In this study only SLDH was taken on the same lines that the cell destruction might result in increased level of it, especially in GIT Carcinoma. LDH was recently recommended as an objective indicator of tumor prognosis[8,9].

As per this study, in the study group 20 cases of various types of GIT Carcinoma were selected in which carcinoma esophagus consisted 25%, carcinoma stomach 30%, Carcinoma colon 20% and carcinoma rectum 25%. Gastric cancer is the fourth most commonly diagnosed malignancy and the second leading cause of cancer death in worldwide. Although the prognosis of gastric cancer has improved in the recent few decades, the overall 5-year survival rate is still poor [1,10]. The main causes of death in gastric cancer patients are recurrence and metastasis.

There is much difference in serum LDH levels in between preoperative and postoperative estimation about 17.35IU/L. High levels of Serum LDH in cases with metastasis pre-

operatively compared to cases without metastasis. Post-operatively Serum LDH value is slightly raised in cases with metastasis (0.25%), but the value decreased in cases without metastasis.

Guo Li et al[11] reported that decrease in serum LDH value were 74.9% during therapy. There was no difference in survival between the patients with decreased serum enzyme levels and those without decreased levels.

Lee H et al [12] observed that among patients with advanced gastric cancer, high serum LDH level was related to better response to chemotherapy but shorter survival duration. The normalization of elevated serum LDH level after chemotherapy was related to good response to treatment.

CONCLUSION

We conclude that from this study, elevated SLDH levels in this study showed as independent diagnostic marker in pre-operative GIT carcinoma patients with and without metastasis. Decreased SLDH levels in postoperative GIT carcinoma patients without metastasis showed as a prognostic marker. Elevated SLDH levels in GIT carcinoma patients with metastasis showed as a poor prognostic marker.

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